Factors Influencing In-Hospital Delay in Treatment With Intravenous Thrombolysis

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Background and Purpose—Shortening door-to-needle time (DNT) for the thrombotic treatment of stroke can improve treatment efficacy by reducing onset-to-treatment time. The goal of our study was to explore the association between DNT and outcome and to identify factors influencing DNT to better understand why some patients are treated late.

Methods—Prospectively collected data from the Safe Implementation of Treatments in Stroke-East registry (SITS-EAST: 9 central and eastern European countries) on all patients treated with thrombolysis between February 2003 and February 2010 were analyzed. Multiple logistic regression analysis was used to identify predictors of DNT \( \leq 60 \) minutes.

Results—Altogether, 5563 patients were treated with thrombolysis within 4.5 hours of symptom onset. Of these, 2097 (38%) had DNT \( \leq 60 \) minutes. In different centers, the proportion of patients treated with DNT \( \leq 60 \) minutes ranged from 18% to 84% (\( P < 0.0001 \)). Patients with longer DNT (in 60-minute increments) had less chance of achieving a modified Rankin Scale score of 0 to 1 at 3 months (adjusted OR, 0.86; 95% CI, 0.77–0.97). DNT \( \leq 60 \) minutes was independently predicted by younger age (in 10-year increments; OR, 0.92; 95% CI, 0.87–0.97), National Institutes of Health Stroke Scale score 7 to 24 (OR, 1.44; 95% CI, 1.2–1.7), onset-to-door time (in 10-minute increments; OR, 1.19; 95% CI, 1.17–1.22), treatment center (\( P < 0.001 \)), and country (\( P < 0.001 \)).

Conclusions—Thrombolysis of patients with older age and mild or severe neurological deficit is delayed. The perception that there is sufficient time before the end of the thrombotic window also delays treatment. It is necessary to improve adherence to guidelines and to treat patients sooner after arrival to hospital. (Stroke. 2012;43:1578-1583.)

Key Words: acute stroke ■ admission-to-treatment time ■ door-to-needle time ■ organized stroke care ■ stroke care ■ thrombolysis

The only proven effective pharmacological therapy of acute ischemic stroke is the application of intravenous tissue-type plasminogen activator (tPA) within 4.5 hours from symptom onset.\(^1\)\(^2\) However, the efficacy of the treatment significantly diminishes with increasing onset-to-treatment time; for example, the odds of achieving a modified Rankin Scale score of 0 to 1 decreases from 2.6 in patients treated 0 to 90 minutes after symptom onset to 1.2 in patients treated 271 to 360 minutes after symptom onset.\(^3\)

Therefore, if the time from symptom onset to admission (onset-to-door-time [ODT]) or time from admission to treatment (door-to-needle time [DNT]) is shortened, it will improve the efficacy of thrombolysis because of shorter onset-to-treatment time. To better understand the factors influencing physician decisions and other factors affecting the timing of initiation of thrombolysis in different hospitals and countries, we analyzed a large international data set of patients treated with tPA.
Methods

This is an analysis of the subset of data from the Safe Implementation of Treatments in Stroke—International Stroke Thrombolysis Registry (SITS-ISTR). SITS-ISTR is a prospective, multinational Internet-based register for patients with acute ischemic stroke. Today, SITS is present in Europe, Australia, Asia, and Central/Latin America. More than 1000 departments in >55 countries participate. Several projects have been accomplished on the basis of the SITS registry. This study is based on an analysis of all data from the SITS-EAST register. Nine countries participate in this registry: Croatia (population 4.4 million), Czech Republic (population 10 million), Estonia (population 1.3 million), Hungary (population 10 million), Lithuania (population 3.3 million), Poland (population 38.2 million), Slovakia (population 5.4 million), Slovenia (population 1.9 million), and Turkey (population 77.8 million), representing the geopolitical region of eastern and central Europe (total population 152.3 million). Data on patients receiving thrombolysis in these countries were collected using the general SITS register platform, but participating countries have ownership limited to the SITS-EAST data. SITS-EAST has its own Steering Committee and International Coordinator who also gave the approval for this article. The methodology of the SITS-EAST register does not differ from the general SITS register, which has already been described in detail.

Our study is based on data of all consecutive patients collected in the SITS-EAST registry between February 28, 2003, and February 28, 2008. All patients with acute ischemic stroke were treated with intravenous thrombolysis with 0.9 mg/kg alteplase. The initial treatment window was 3 hours after system onset, but after the publication of results of the European Cooperative Acute Stroke Study (ECASS) 3 trial (September 2008) and the SITS-ISTR 3- to 4.5-hour study, the window was extended to 4.5 hours (treatment before and after October 1, 2008, was explored as a predictor variable). Indications and contraindications for treatment with alteplase were fully compliant with European Summary of Product Characteristics criteria in 66% of cases and were not compliant in 34%, mostly due to time-to-treatment >3 hours (13.1%), treatment with intravenous antihypertensive medications (8.3%), age >80 years (7.3%), use of oral anticoagulant before admission (4.2%), a combination of stroke history and concomitant diabetes (3.9%), and history of previous stroke <3 months before admission (2.7%).

The following variables were documented and used for analysis: age, sex, medical history (hypertension, diabetes, previous stroke, atrial fibrillation, congestive heart failure, hyperlipidemia, smoking status, use of antplatelets), baseline characteristics (National Institutes of Health Stroke Scale [NIHSS] score, systolic blood pressure, glucose, patient weight, dose of tPA, presence of early ischemic changes on CT/MRI), ODT, DNT, treatment within working hours (8 AM to 4 PM, Monday to Friday), treatment after October 1, 2008, number of patients treated in each center, country of treatment, modified Rankin Scale score at 3 months, and presence of symptomatic intracerebral hemorrhage according to SITS, National Institute of Neurological Disorders and Stroke, and ECASS II definitions. Adjusting for the following variables were used: sex, age, baseline NIHSS score, systolic blood pressure (130–170 mm Hg), onset-to-treatment time, treatment after October 1, 2008, presence of hypertension, diabetes, atrial fibrillation, previous stroke, early ischemic changes on CT/MRI, current smoking, congestive heart failure, and use of antplatelets.

Results

Altogether, 5563 patients were treated with thrombolysis within 4.5 hours of symptom onset in 124 centers in 9 counties. Of these, 2097 (38%) were treated with DNT ≤ 60 minutes, 3414 (61%) with DNT >60 minutes, and 52 (1%) were excluded due to missing value of DNT. In different centers, the proportion of patients treated with DNT ≤ 60 minutes ranged from 18% to 84% (P < 0.0001). At the country level, the proportion of patients treated with DNT ≤ 60 minutes ranged from 19% to 60% (P < 0.001). The overall median DNT was 71 minutes (interquartile range, 52–95).

The patient and hospital characteristics are shown in Table 1. Patients treated with DNT ≤ 60 minutes and DNT >60 minutes significantly differed in age, NIHSS, blood pressure, glucose level, early ischemic changes on CT/MRI, history of previous stroke, and treatment before October 1, 2008.

Analysis of the relationship between different variables and DNT ≤ 60 minutes revealed that DNT ≤ 60 minutes was achieved in a similar proportion of patients with middle ranges of NIHSS (score 7–24) or systolic blood pressure (130–170 mm Hg) but differed for lower and higher values (Figure). Therefore, for further analysis, NIHSS and systolic blood pressure were divided into categories and middle ranges were compared with higher and lower values of NIHSS and systolic blood pressure.

Multivariate analysis (Table 2) showed that the following variables were independently associated with DNT ≤ 60 minutes: younger age (10-year increments; OR, 0.92; 95% CI, 0.87–0.97), NIHSS score 7 to 24 (OR, 1.44; 95% CI, 1.2–1.7), ODT (10-minute increments; OR, 1.19; 95% CI, 1.17–1.22), center (P < 0.001), and country (P < 0.001). Sensitivity analysis revealed that results were similar if only patients with ODT ≤ 120 minutes were analyzed.

The outcome of patients stratified according to DNT is shown in Table 3. Patients with longer DNT had less chance of achieving modified Rankin Scale score of 0 to 1 at 3 months and tended to have higher odds of symptomatic intracranial hemorrhage (odds were significantly increased...
for symptomatic intracranial hemorrhage only according to SITS definition).

**Discussion**

Our study confirms that “time is brain” because patients with longer DNT had worse outcomes. Therefore, achieving DNT ≤60 minutes for the majority of thrombolytic therapy candidates is a desirable goal. Our study improved our understanding of why this goal is not achieved, because our study identified factors delaying physician decision to initiate thrombolysis. These factors can fall into 3 categories: (1) perception of urgency (ie, time remaining before the end of the treatment window); (2) patient characteristics; and (3) differences in stroke management within stroke centers and countries.

First of all, our study shows that for every 10-minute increment in time from symptom onset to admission, there are 19% higher odds that a patient will be treated with tPA within 60 minutes after admission to the hospital. The explanation is that physician perception of having less time translates into faster action to initiate treatment with tPA. Consequently, although physicians manage to thrombolize patients arriving at the end of the treatment window, they simultaneously waste the opportunity to offer highly effective treatment to

### Table 1. Patient and Hospital Characteristics

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>All (N=5563)</th>
<th>DNT ≤60 Min (N=2097)</th>
<th>DNT &gt;60 Min (N=3414)</th>
<th>P Value*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sex, female, no. (%)</td>
<td>2304 (41%)</td>
<td>853 (41%)</td>
<td>1433 (42%)</td>
<td>0.34</td>
</tr>
<tr>
<td>Age, year, mean (SD)</td>
<td>66 (12)</td>
<td>66 (12)</td>
<td>67 (12)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>NIHSS, median (IQR)</td>
<td>12 (8–17)</td>
<td>12 (8–17)</td>
<td>12 (8–17)</td>
<td>0.038</td>
</tr>
<tr>
<td>NIHSS 7–24, no. (%)</td>
<td>4489 (81%)</td>
<td>1730 (83%)</td>
<td>2771 (80%)</td>
<td>0.009</td>
</tr>
<tr>
<td>Systolic BP, mm Hg, mean (SD)</td>
<td>153 (20)</td>
<td>153 (20)</td>
<td>153 (20)</td>
<td>0.89</td>
</tr>
<tr>
<td>Systolic BP, 130–170 mm Hg, no. (%)</td>
<td>3839 (69%)</td>
<td>1495 (71%)</td>
<td>2344 (68%)</td>
<td>0.005</td>
</tr>
<tr>
<td>Glucose, mmol/L, median (IQR)</td>
<td>6.8 (5.9–8.1)</td>
<td>6.7 (5.8–8.0)</td>
<td>6.8 (5.9–8.2)</td>
<td>0.03</td>
</tr>
<tr>
<td>Patient weight, kg, mean (SD)</td>
<td>81 (15)</td>
<td>81 (14)</td>
<td>81 (15)</td>
<td>0.46</td>
</tr>
<tr>
<td>Early ischemic changes on CT or MRI, no. (%)</td>
<td>739 (13%)</td>
<td>348 (17%)</td>
<td>371 (11%)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Dose of tPA, median (IQR)</td>
<td>70 (63–80)</td>
<td>70 (62–80)</td>
<td>70 (63–80)</td>
<td>0.94</td>
</tr>
<tr>
<td>Hypertension, no. (%)</td>
<td>3995 (72%)</td>
<td>1490 (71%)</td>
<td>2475 (71%)</td>
<td>0.12</td>
</tr>
<tr>
<td>Diabetes mellitus, no. (%)</td>
<td>1202 (22%)</td>
<td>460 (22%)</td>
<td>742 (21%)</td>
<td>0.68</td>
</tr>
<tr>
<td>Previous stroke, no. (%)</td>
<td>679 (12%)</td>
<td>231 (11%)</td>
<td>448 (13%)</td>
<td>0.04</td>
</tr>
<tr>
<td>DM and previous stroke, no. (%)</td>
<td>176 (3%)</td>
<td>55 (3%)</td>
<td>121 (4%)</td>
<td>0.06</td>
</tr>
<tr>
<td>Atrial fibrillation, no. (%)</td>
<td>1510 (27%)</td>
<td>540 (26%)</td>
<td>970 (28%)</td>
<td>0.11</td>
</tr>
<tr>
<td>Congestive heart failure, no. (%)</td>
<td>712 (13%)</td>
<td>265 (13%)</td>
<td>447 (13%)</td>
<td>0.69</td>
</tr>
<tr>
<td>Hyperlipidemia, no. (%)</td>
<td>1786 (32%)</td>
<td>648 (31%)</td>
<td>1138 (33%)</td>
<td>0.37</td>
</tr>
<tr>
<td>Current smoker, no. (%)</td>
<td>1254 (23%)</td>
<td>492 (24%)</td>
<td>762 (22%)</td>
<td>0.198</td>
</tr>
<tr>
<td>Antiplatelets before stroke, no. (%)</td>
<td>1612 (29%)</td>
<td>592 (28%)</td>
<td>1020 (30%)</td>
<td>0.30</td>
</tr>
<tr>
<td>Patients treated after October 1, 2008, no. (%)</td>
<td>2375 (43%)</td>
<td>854 (41%)</td>
<td>1521 (44%)</td>
<td>0.01</td>
</tr>
<tr>
<td>Working hours, 8–16 h (Monday to Friday), no. (%)</td>
<td>2274 (41%)</td>
<td>883 (42%)</td>
<td>1391 (40%)</td>
<td>0.159</td>
</tr>
<tr>
<td>Onset-to-door-time, min, median (IQR)</td>
<td>70 (48–100)</td>
<td>90 (60–120)</td>
<td>60 (45–84)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Door-to-imaging time, min, median (IQR)</td>
<td>20 (12–32)</td>
<td>15 (10–21)</td>
<td>27 (15–40)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>No. of patients treated in center, median (IQR)</td>
<td>84 (45–188)</td>
<td>101 (60–188)</td>
<td>84 (42–188)</td>
<td>0.001</td>
</tr>
<tr>
<td>Prestroke disability (mRS 3–5), no. (%)</td>
<td>374 (%)</td>
<td>133 (6%)</td>
<td>240 (7%)</td>
<td>0.21</td>
</tr>
<tr>
<td>Czech Republic, no. (%)</td>
<td>3054 (55%)</td>
<td>1255 (41%)</td>
<td>1799 (50%)</td>
<td>0.58</td>
</tr>
<tr>
<td>Poland, no. (%)</td>
<td>1015 (18%)</td>
<td>343 (34%)</td>
<td>672 (66%)</td>
<td>0.66</td>
</tr>
<tr>
<td>Slovak Republic, no. (%)</td>
<td>409 (7%)</td>
<td>79 (19%)</td>
<td>330 (24%)</td>
<td>0.79</td>
</tr>
<tr>
<td>Slovenia, no. (%)</td>
<td>305 (5%)</td>
<td>182 (60%)</td>
<td>113 (38%)</td>
<td>0.38</td>
</tr>
<tr>
<td>Hungary, no. (%)</td>
<td>305 (5%)</td>
<td>100 (33%)</td>
<td>205 (67%)</td>
<td>0.67</td>
</tr>
<tr>
<td>Estonia, no. (%)</td>
<td>192 (3%)</td>
<td>53 (28%)</td>
<td>138 (72%)</td>
<td>0.72</td>
</tr>
<tr>
<td>Croatia, no. (%)</td>
<td>148 (3%)</td>
<td>37 (25%)</td>
<td>111 (75%)</td>
<td>0.75</td>
</tr>
<tr>
<td>Lithuania, no. (%)</td>
<td>93 (2%)</td>
<td>37 (40%)</td>
<td>56 (60%)</td>
<td>0.60</td>
</tr>
<tr>
<td>Turkey, no. (%)</td>
<td>46 (1%)</td>
<td>11 (24%)</td>
<td>35 (76%)</td>
<td>0.76</td>
</tr>
<tr>
<td>Difference between countries</td>
<td>&lt;0.001</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

DNT indicates door-to-needle time; NIHSS, National Institutes of Health Stroke Scale; IQR, interquartile range; BP, blood pressure; tPA, tissue plasminogen activator; DM, diabetes mellitus; mRS, modified Rankin Scale.

*P value of (1) t test for age, systolic BP, patient weight; (2) Mann-Whitney test for NIHSS, glucose, dose of tPA, onset-to-door time, door-to-imaging time, and no. of patients treated in center; and (3) χ² test for binary variables.
patients arriving early. The same observation has been made in Austria and in the United States, where for every 10-minute increase in ODT, there were very similar 23% higher odds of being treated with DNT in 60 minutes. In our previous study based on data from the whole SITS registry, we reported that extending the treatment window for thrombolysis from 0 to 3 hours to 0 to 4.5 hours did not influence DNT. In our study, we further analyzed whether the publication of the ECASS 3 trial in September 2008 changed the odds of being treated with DNT in 60 minutes.

Truly, in univariate analysis, treatment after October 2008 decreased the odds of being treated with DNT in 60 minutes, but this association became nonsignificant in the final model. The explanation is that in 8 centers, DNT was longer after the extension of the time window for tPA treatment, but adding “center” to the multivariate model took away the statistical significance of variable “treatment after October 1, 2008.” Therefore, the effect of the treatment window extension on DNT needs to be closely watched and clarified. In the meantime, all data strongly support the need for action: DNT has to be monitored and established as 1 of the important benchmarks of quality of care in stroke centers.

The other important finding of our study is that physicians are delaying initiation of thrombolytic therapy in patients who are older and have lower or higher NIHSS. The most likely explanation is that in these subgroups of patients, thrombolysis is perceived as less beneficial. This is important to realize because delaying therapy in patients with poorer prognoses at baseline due to higher age or NIHSS is further promoting their unfavorable outcome. This happens despite the fact that analysis of the National Institute of Neurological Disorders and Stroke and ECASS 3 trials and recently the Virtual International Stroke Trials Archive (VISTA) database showed that age or baseline NIHSS does not modify the efficacy of tPA treatment.

Our study further showed that patients in some central and eastern European countries had higher odds of being treated in 60 minutes after admission to the hospital than other countries. The most likely explanation is that certain properties of different healthcare services (such as accessibility to CT scanners, stroke units, emergency departments, etc) may account for this finding. SITS data, however, do not contain information on the specifics of healthcare services in each country, and therefore our finding needs to be clarified in other studies.

In contrast to a study from the United States, several patients and hospital characteristics did not influence DNT in our study, specifically the experience of stroke centers (measured both as tPA treatments per year and total tPA treatments), patient sex, or the time of day when patients were treated. These positive findings can likely be explained by differences between US and central/eastern European healthcare systems.

The limitation of our study is that the comparison between countries may have been affected by the fact of differing participating numbers of centers performing thrombolytic
from each country; for example, many centers participated from the Czech Republic (51) and Poland (27), but there were only 2 from Lithuania. This can explain the rather large difference in the proportion of patients treated with DNT/60 minutes in between different countries. Although our analysis suggests that different healthcare systems may affect DNT, this finding remains so far hypothetical. Another limitation is that several variables that could potentially influence DNT were not collected in the SITS register and therefore could not be analyzed; for example, the existence of hospital prenoti-

<table>
<thead>
<tr>
<th>Variable</th>
<th>Univariate Analysis</th>
<th>Multivariate Analysis</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>OR (95% CI)*</td>
<td>P Value†</td>
</tr>
<tr>
<td>Sex, female</td>
<td>0.95 (0.85–1.06)</td>
<td>0.34</td>
</tr>
<tr>
<td>Age, increment by 10 y</td>
<td>0.92 (0.88–0.96)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Baseline NIHSS 7–24</td>
<td>1.21 (1.05–1.40)</td>
<td>0.009</td>
</tr>
<tr>
<td>Systolic blood pressure, 130–170 mm Hg</td>
<td>1.19 (1.05–1.34)</td>
<td>0.005</td>
</tr>
<tr>
<td>Glucose, mmol/L</td>
<td>0.98 (0.96–1.004)</td>
<td>0.11</td>
</tr>
<tr>
<td>Patient weight</td>
<td>0.99 (0.995–1.002)</td>
<td>0.47</td>
</tr>
<tr>
<td>Early ischemic changes on CT or MR</td>
<td>1.60 (1.37–1.87)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Dose of tPA</td>
<td>1.0 (0.996–1.005)</td>
<td>0.87</td>
</tr>
<tr>
<td>Hypertension</td>
<td>0.91 (0.80–1.02)</td>
<td>0.12</td>
</tr>
<tr>
<td>Diabetes mellitus</td>
<td>1.03 (0.90–1.17)</td>
<td>0.68</td>
</tr>
<tr>
<td>Previous stroke</td>
<td>0.84 (0.71–0.99)</td>
<td>0.042</td>
</tr>
<tr>
<td>Diabetes mellitus and previous stroke</td>
<td>0.74 (0.53–1.02)</td>
<td>0.07</td>
</tr>
<tr>
<td>Atrial fibrillation</td>
<td>0.90 (0.80–1.02)</td>
<td>0.11</td>
</tr>
<tr>
<td>Congestive heart failure</td>
<td>0.96 (0.82–1.13)</td>
<td>0.66</td>
</tr>
<tr>
<td>Hyperlipidemia</td>
<td>0.95 (0.84–1.07)</td>
<td>0.37</td>
</tr>
<tr>
<td>Current smoker</td>
<td>1.09 (0.96–1.24)</td>
<td>0.20</td>
</tr>
<tr>
<td>Antiplatelets before stroke</td>
<td>0.94 (0.83–1.06)</td>
<td>0.31</td>
</tr>
<tr>
<td>Onset-to-door time, increment by 10 min</td>
<td>1.18 (1.16–1.20)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Treatment after October 1, 2008</td>
<td>0.87 (0.78–0.97)</td>
<td>0.011</td>
</tr>
<tr>
<td>Working hours, 8–16 h (Monday to Friday)</td>
<td>1.08 (0.97–1.21)</td>
<td>0.16</td>
</tr>
<tr>
<td>No. of patients treated in centre</td>
<td>1.0 (1.0–1.001)</td>
<td>0.47</td>
</tr>
<tr>
<td>Prestroke disability (mRS 3–5 versus 0–2)</td>
<td>0.88 (0.71–1.10)</td>
<td>0.27</td>
</tr>
<tr>
<td>Centre</td>
<td>NA</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Country</td>
<td>NA</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>SI versus CR</td>
<td>2.23 (1.74–2.84)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>LT versus CR</td>
<td>0.93 (0.61–1.42)</td>
<td>0.735</td>
</tr>
<tr>
<td>PL versus CR</td>
<td>0.72 (0.62–0.84)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>HU versus CR</td>
<td>0.70 (0.54–0.90)</td>
<td>0.005</td>
</tr>
<tr>
<td>EE versus CR</td>
<td>0.54 (0.39–0.75)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>HR versus CR</td>
<td>0.47 (0.32–0.69)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>TR versus CR</td>
<td>0.44 (0.22–0.87)</td>
<td>0.019</td>
</tr>
<tr>
<td>SK versus CR</td>
<td>0.35 (0.27–0.45)</td>
<td>&lt;0.001</td>
</tr>
</tbody>
</table>

For countries, percentage of all patients and percentage of patients in country are presented. For all other parameters, percentage of patients in groups door-to-needle time <60 min and >60 min are presented.

NIHSS indicates National Institutes of Health Stroke Scale; tPA, tissue plasminogen activator; mRS, modified Rankin Scale; SI, Slovenia; CR, Czech Republic; LT, Lithuania; PL, Poland; HU, Hungary; EE, Estonia; HR, Croatia; TR, Turkey; SK, Slovakia; NA, not applicable.

*OR for door-to-needle time (<60 min/>60 min) and its 95% Wald CIs.
†P value of Wald χ² test.

Table 2. Univariate and Multivariate Analysis for Door-to-Needle Time ≤60 Min
In-Hospital Delays for Thrombolysis

Table 3. Outcome Stratified According to DNT by 60 Min

<table>
<thead>
<tr>
<th>Door-to-Needle Time, Min</th>
<th>≤60 (N=2097)</th>
<th>61–180 (N=3339)</th>
<th>&gt;180 (N=75)</th>
<th>OR (95% CI)*</th>
<th>OR (95% CI)*</th>
</tr>
</thead>
<tbody>
<tr>
<td>mRS 0–1</td>
<td>84%</td>
<td>82%</td>
<td>79%</td>
<td>1.09 (0.97–1.22)</td>
<td>0.86 (0.77–0.97)</td>
</tr>
<tr>
<td>sICH—SITS</td>
<td>1.5%</td>
<td>2.0%</td>
<td>6.7%</td>
<td>1.37 (1.01–1.79)</td>
<td>1.37 (0.95–1.79)</td>
</tr>
<tr>
<td>sICH—NINDS</td>
<td>6.9%</td>
<td>8.0%</td>
<td>10.7%</td>
<td>1.13 (0.99–1.30)</td>
<td>1.11 (0.93–1.34)</td>
</tr>
<tr>
<td>sICH—ECASS II</td>
<td>5.0%</td>
<td>6.0%</td>
<td>10.7%</td>
<td>1.20 (1.04–1.39)</td>
<td>1.17 (0.96–1.43)</td>
</tr>
</tbody>
</table>

DNT indicates door-to-needle time; mRS, modified Rankin Scale; sICH SITS, symptomatic intracerebral hemorrhage Safe Implementation of Treatment in Stroke; sICH NINDS, symptomatic intracerebral hemorrhage National Institute of Neurological Disorders and Stroke; sICH ECASS II, symptomatic intracerebral hemorrhage European Cooperative Acute Stroke Study.

*OR for door-to-needle time (<60 min) >60 min and its 95% Wald CI.

Conclusions

Our study demonstrated that physicians delay thrombolysis if they have more time before the end of the thrombolytic treatment window, if they perceive that thrombolysis would be less beneficial, or likely due to poor management at the center or country level. Therefore, it is necessary to improve adherence to guidelines and to treat patients as soon as possible after arrival to the hospital (in the majority within 60 minutes) regardless of the amount of time left to the end of thrombolytic window and in all patients for whom thrombolysis is indicated.

Sources of Funding

R.M. and P.K. have received research support from the European Regional Development Fund Project FNUSA-ICRC (No. CZ.1.05/1.1.00/02.0123), R.M., A.C., A.K., V.S., K.F., J.K., A.V., D.J., Y.K., and N.A. have received research support through a grant from the European Union Public Health Executive Agency (EAHC). A.C. and A.K. were supported until 2008 by Polish National Program for Prevention and Treatment of Cardiovascular Diseases. The Safe Implementation of Treatments in Stroke–International Stroke Thrombolysis Registry (SITS-ISTR), which is funded by an unrestricted grant from Boehringer Ingelheim and Ferrer, and financial support was also provided through the regional agreement on medical training and research (ALF) between Stockholm County Council and the Karolinska Institute.

Disclosures

R.M., A.C., A.K., and D.J. have received honoraria payments and travel support from Boehringer-Ingelheim. L.C. has received honoraria payment from Bayer, Boehringer Ingelheim, MSD, Sanofi-Aventis, and Egis and was a member of advisory board in the Management of Atherothrombosis With Clopidogrel in High-Risk Patients (MATCH) trial, Rivaroxaban Once-daily oral Direct Factor Xa Inhibition Compared with Vitamin K Antagonism for Prevention of Stroke and Embolism Trial (ROCKET) trial, and in Bayer Company. N.A. is a senior researcher in the Safe Implementation of Treatments in Stroke International, which receives a grant from Boehringer Ingelheim and Ferrer for the Safe Implementation of Treatments in Stroke- the Monitoring study/International Stroke Thrombolysis Registry.

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Factors Influencing In-Hospital Delay in Treatment With Intravenous Thrombolysis
Robert Mikulík, Pavla Kadlecová, Anna Czlonkowska, Adam Kobayashi, Miroslav Brozman, Viktor Svigelj, Laszlo Csiba, Klara Fekete, Janika Körv, Vida Demarin, Aleksandras Vilionskis, Dalius Jatuzis, Yakup Krespi and Niaz Ahmed
for the Safe Implementation of Treatments in Stroke-East Registry (SITS-EAST) Investigators

Stroke. 2012;43:1578-1583; originally published online March 15, 2012;
doi: 10.1161/STROKEAHA.111.644120
Stroke is published by the American Heart Association, 7272 Greenville Avenue, Dallas, TX 75231
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Print ISSN: 0039-2499. Online ISSN: 1524-4628

The online version of this article, along with updated information and services, is located on the World Wide Web at:
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